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| IDENTIFIERS | *Environmental Sciences; National Science Foundation |

ABSTRACT

This is a list of curriculum projects supported by the National Science Foundation (NSF) which include materials with environmental implications even though the titles may not necessarily indicate that this is the case. Other NSF programs listed are: The Summer Institutes in Environmental Sciences for Secondary School Teachers; Summer Conferences and In-Service Institutes in Environmental Sciences; Secondary School Student Science Training Program; Undergraduate Curriculum Activities; Undergraduate Instructional Personnel Development Program; and, projects funded for student originated and directed research in environmental problems. (VLW)

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# NATIONAL SCIENCE FOUNDATION

SE 002 060

## *Programs for Improving Education in the*

# Environmental Sciences

## *1971*

- ELEMENTARY SCHOOL
- SECONDARY SCHOOL
- COLLEGE AND UNIVERSITY

# Preface

Improvement in science education is one of the major tasks of the National Science Foundation which supports projects for elementary and secondary schools and colleges and universities in mathematics and the sciences, including social sciences.

Activities of the Division of Pre-College Education in Science fall into four categories: (1) development of educational materials through the Course Content Improvement Program, (2) implementation activities through Resource Personnel Workshops in the Course Content Improvement Program and through the Cooperative College-School Science Program, (3) instructional personnel development through the institute programs (Summer, In-Service, and Academic Year) and conferences, and (4) student development through the Student Science Training Program.

Activities of the Division of Undergraduate Education in Science include: (1) development of educational material through the College Science Curriculum Improvement Program (2) instructional personnel development through the Program of Summer Institutes and Short Courses, (3) and student development through the Student Originated Studies Program and the Undergraduate Research Participation Program.

A list of projects which deal to some degree with environmental sciences and which are supported under these programs has been drawn together for presentation in this report.

Projects listed here were supported by the Foundation in fiscal year 1971. With the exception of development of curriculum materials, individual projects change from year to year, but the programs continue. The time schedule for submitting proposals for NSF Programs for Education in the Sciences may be obtained by addressing requests to Central Processing Section, National Science Foundation, Washington, D.C. 20550. Directories listing institutes to be offered in 1972 may be requested from the Foundation; they will be mailed when they become available.

## PRE-COLLEGE CURRICULUM ACTIVITIES

The National Science Foundation has supported, over the years, curriculum projects which include materials with environmental implications even though the titles may not necessarily indicate that this is the case. Some of the current projects deal primarily with environmental education, as their titles indicate.

**Elementary School Environmental Science**

1. American Association for the Advancement of Science (AAAS), Commission of Science Education, 1515 Massachusetts Avenue NW., Washington, D.C. 20005. *Science–A Process Approach* published by Xerox Corporation, 600 Madison Avenue, New York, N.Y. 10022.
2. Elementary Science Study (ESS), Education Development Center (EDC), 55 Chapel Street, Newton, Massachusetts 02160. *Elementary Science Study* published by Webster Division of McGraw-Hill Book Company, Manchester, Missouri 63011.
3. Science Curriculum Improvement Study (SCIS), University of California, Berkeley, California 94720. *Science Curriculum Improvement Study* published by Rand McNally & Company, P. O. Box 7600, Chicago, Illinois 60680.
4. Minnesota School Mathematics and Science Teaching Project (MINNEMAST), University of Minnesota, Minneapolis, Minnesota 55455.

**Secondary School Environmental Science**

5. Earth Science Curriculum Project (ESCP), P. O. Box 1559, Boulder, Colorado 80302. *Investigating the Earth* published by Houghton Mifflin Company, 2 Park Street, Boston, Massachusetts 02107.
6. American Meteorological Society (AMS), 45 Beacon Street, Boston, Massachusetts 02108. "Education Films in Meteorology," Dr. Kenneth C. Spengler.
7. Intermediate Science Curriculum Study (ISCS), Florida State University, Tallahassee, Florida 32306. *Probing the Natural World* published by Silver Burdett Company, Morristown, New Jersey 07960.
8. High School Geography Project (HSGP), Association of American Geographers, 1710 Sixteenth Street NW., Washington, D.C. 20009. *Geography in an Urban Age* published by Macmillan Company, 866 Third Avenue, New York, N.Y. 10022.
9. Biological Science Curriculum Study (BSCS), P. O. Box 930, University of Colorado, Boulder, Colorado 80302. *High School Biology–BSCS Green Version* published by Rand McNally & Company, P. O. Box 7600, Chicago, Illinois 60680.
10. Engineering Concepts Curriculum Project (ECCP), 333 Jay Street, Brooklyn, New York 11201. *The Man Made World* published by McGraw-Hill Book Company, Incorporated, 330 W. 42nd Street, New York, N.Y. 10036.

**General**

American Association for the Advancement of Science, Commission on Science Education, 1515 Massachusetts Avenue NW., Washington, D.C. 20005. "Science for Society: A Bibliography."

There are several projects currently under way. In some cases, no materials are available as yet. Further information is available from the projects.

1. *A Workshop to Prepare a Study Guide on Problems of Air Pollution,* Robert G. Nurnberger, 1400 Washington Avenue, Albany, New York 12003.
2. *Environmental Studies for Urban Youth,* William Romey, Earth Science Curriculum Project (ESCP), P. O. Box 1559, Boulder Colorado 80302.
3. *Ecological Film Project,* Martin Sacks and Dr. John Lee, City College of New York, Convent Avenue and 139th Street, New York, N.Y. 10031.
4. *Environmental Experiments Program,* Courtland S. Randall, Oak Ridge Associated Universities, Incorporated, P. O. Box 117, Oak Ridge, Tennessee 37830.
5. *Social Biology Films,* L. Eugene Cronin, Natural Resources Institute, University of Maryland, Solomons, Maryland 20688.
6. *Oak Ridge National Laboratory Project: "The Environment and Technology Assessment,"* Cooperative Science Education Center, Peter Cohan, 156 Adams Lane, Oak Ridge, Tennessee 37830.

## PRE-COLLEGE IMPLEMENTATION ACTIVITIES

### Resource Personnel Workshops

The workshops provide leadership training for the introduction of new course materials in science and mathematics for elementary and secondary schools; the participants include teachers, principals, science or mathematics supervisors, personnel from state departments of education, and college faculty or combinations of these formed into educational teams.

Workshop activities include teaching new materials to students, developing educational teams to introduce the new course materials, instructing teachers, and designing and conducting workshop activities for school personnel in their local regions. Summer workshops typically last 3 to 4 weeks. In addition to the summer training, the workshop staffs may provide support activities during the school year for the training of additional teachers.

**Resource Personnel Workshops in Environmental Sciences—Summer 1971**

**Engineering Concepts Curriculum Project**

University of Denver, Denver, Colorado 80210; Ruth I. Hoffman, Department of Mathematics

University of South Florida, Tampa, Florida 33620; E. W. Kopp, College of Engineering

Polytechnic Institute of Brooklyn, Brooklyn, New York 11201; John G. Truxal, Provost

North Carolina State University, Raleigh, North Carolina 27607; Herbert E. Speece, Department of Science and Mathematics

University of Wisconsin, Madison, Wisconsin; W. Robert Marshall, Jr., Engineering Experiment Station

**High School Geography Project**

Western Michigan University, Kalamazoo, Michigan 49001; George Vuicich, Department of Geography

**Intermediate Science Curriculum Study**

Florida State University, Tallahassee, Florida 32306; Paul Westmeyer, Department of Science Education

Michigan State University, East Lansing, Michigan 48823; Richard J. McLeod, Science and Mathematics Teaching Center

University of Texas, Austin, Texas 78712; David R. Stronck, Science Education Center

Wisconsin State University, Whitewater, Wisconsin 53190; Frank D. Stekel, Department of Physics

**Science Curriculum Improvement Study**

San Francisco State College, San Francisco, California 94132; Leonard Meshover, Department of Elementary Education

Kansas State Teachers College, Emporia, Kansas 66801; Glenn H. Crumb, Research and Grants Center

Michigan State University, East Lansing, Michigan 48823; Glenn D. Berkheimer, Science and Mathematics Teaching Center

Temple University, Philadelphia, Pennsylvania 19122; Chester E. Raun, Department of Elementary Education, and Sylvester Webb

**Time, Space, and Matter**

University of Missouri, Columbia, Missouri 65201; John B. Leake, Department of Education

## Cooperative College-School Science Program

This program provides opportunities for colleges, universities, and similar institutions to work with school systems in improving elementary and secondary school science and mathematics programs. Projects are addressed to practical problems of the school science program which are of sufficient substance and complexity to warrant a cooperative approach. Many projects have as their purpose the introduction into school classrooms of one of the instructional programs which have been developed in the last few years by teams of scientists and educators. For the most part both summer training of 4 to 8 weeks and followup activities during the succeeding academic year is provided.

### Cooperative College-School Science Projects in Environmental Sciences—1971-72

California State College, Bakersfield, California 93304; Interdisciplinary Science (Environmental Science); Dr. John R. Coash, School of Natural Sciences and Mathematics

Florida Technological University, Orlando, Florida 32816; Biology (Fresh Water Biology); Dr. George E. Allen, Department of Biological Sciences

Springfield College, Springfield, Massachusetts 01109; Elementary Science (Environmental Science and Elementary Science Study materials); Mr. Edgar N. Johnson, Department of Chemistry

Wayne State University, Detroit, Michigan 48202; Environmental Science, Dr. Henry O. Hooper, Department of Physics

Northeast Missouri State College, Kirksville, Missouri 63501; Environmental Science (Environmental Studies for Urban Youth materials); Dr. Dean A. Rosebery, Division of Science

Glassboro State College, Glassboro, New Jersey 08028; Environmental Science; Dr. V. Eugene Vivian, Department of Science

University of Pittsburgh, Pittsburgh, Pennsylvania 15213; Earth Science; Dr. Norman K. Flint, Department of Earth and Planetary Sciences

## PRE-COLLEGE INSTRUCTIONAL PERSONNEL DEVELOPMENT

### Summer Institutes

The Summer Institutes Program of the National Science Foundation was created in recognition of the important role of teachers in developing the Nation's scientific manpower potential. The institutes are designed to strengthen the subject-matter competence of science and mathematics teachers and to increase the effectiveness of their teaching. Duration varies between 6 and 8 weeks.

**Summer Institutes in Environmental Sciences for Secondary School Teachers—1971**

Kansas State Teachers College, Emporia, Kansas 66801; Environmental Biology; Human Ecology; Harold Durst, Department of Biology

University of Michigan, Dearborn Campus, 4901 Evergreen Road, Dearborn, Michigan 48128; Environmental Science; Orin G. Gelderloos, Department of Experimental Biology

Mount Marty College, Yankton, South Dakota 57078; Environmental Biology in Field and Laboratory; Sr. Veronica Fasbender, Department of Biology

Northeast Missouri State College, Kirksville, Missouri 63501; Ecological Core Program; Dean A. Roseberry, Division of Science

University of Northern Colorado, Greeley, Colorado 80631; The Biology of Populations, Environmental Pollution, Ecosystem Modification, Seminar—Social Implications of Biology; Ivo E. Lindauer, Department of Biological Science

Northern Illinois University, DeKalb, Illinois 60115; Environmental Biology; Robert A. Bullington, Department of Biological Sciences

Western Michigan University, Kalamazoo, Michigan 49001; Physiological Responses to Change, Human Ecology, Human Adaptation; Clarence J. Goodnight, Department of Biology

Edinboro State College, Edinboro, Pennsylvania 16412; Earth Science Environment and Resources Study, ESCP-ESP; M. C. Schneider, Department of Earth Sciences

Slippery Rock State College, Slippery Rock, Pennsylvania 16057; Earth's Resources and Man's Environment; Kent Bushnell, Department of Geology

Claflin College, Orangeburg, South Carolina 29115; Earth Science (ESCP), Environmental Conservation, Seminar; Hampton D. Smith, Sr., Division of Science and Mathematics

Radford College, Radford, Virginia 24141; General Ecology; David J. Moore, Department of Biology

The University of Iowa, Iowa City 52240; Contemporary Problems of Society, Ecological Studies, Pollution Problems, Seminar in Interdisciplinary Environmental Studies; Robert E. Yager, Science Education Center

Kansas State Teachers College, Emporia, Kansas 66801; Earth and Environmental Science, Course and Curriculum Development in Environmental Science, Earth Science Field Experience; Thomas E. Bridge, Department of Physical Science (Geology)

The Ohio State University, Columbus, Ohio 43210; Environmental Sciences (Ecology, Geomorphology, Hydrogeology), Environmental Management, Field Research; Victor J. Mayer, Faculty of Science and Mathematics Education, 250 Arps Hall, 1945 N. High Street, Columbus, Ohio 43210

Saint Joseph College, West Hartford, Connecticut 06117; Environmental Studies, Research; Sr. M. Clare Markham, Department of Chemistry

Texas A&M University, College Station, Texas 77843; Environment-Resources-Population: An Ecological Evaluation; Richard J. Baldauf, Department of Wildlife Science

Wisconsin State Universities, Madison, Wisconsin 53701; at Chippewa Lake Field Station, Clam Lake, Wisconsin; Environmental Assessment; Roy E. Heath, Board of Regents of State Universities, Box 912, Madison, Wisconsin 53701

Wisconsin State University–Superior, Superior, Wisconsin 54880; Environmental Science; Rudy G. Koch, Department of Biology

Massachusetts Institute of Technology, Cambridge, Massachusetts 02139; Course and Curriculum Development in Science(s) (including Environmental Science and Interdisciplinary Topics); for teams of science teachers from single schools (Director: J. R. Zacharias, Massachusetts Institute of Technology); write: Berol L. Robinson, Education Research Center, Room 20C-228, Cambridge, Massachusetts 02139

Foresta Institute for Ocean & Mountain Studies, Carson City, Nevada 89701; Environmental Sciences–Ecology, primarily for science and social studies teachers from Washoe County, Nevada, and neighboring areas; Richard G. Miller, Director of Foresta Institute, Box 620, Rt. 1, Carson City, Nevada 89701

New England Association of Chemistry Teachers (at Fairfield University, Fairfield, Connecticut); Air as a Natural Resource, for chemistry teachers in the northeastern states; Russell Meinhold, Rhode Island College, 600 Mt. Pleasant Avenue, Providence, Rhode Island 02908

Salem State College, Salem, Massachusetts 01970; Sulfur and the Water Environment, for New England area biology and chemistry teachers and science supervisors; Clair M. Paine, Department of Biology

Shorter College, Rome, Georgia 30161; Natural Resource Use; Philip Greear, Box 2, Shorter College

Tilton School, Tilton, New Hampshire 03276 (at Quincy, Massachusetts, and Philadelphia, Pennsylvania); Water Pollution and Environmental Activities, for teachers of environmental studies, primarily from the Boston and Philadelphia areas; Joseph H. Chadbourne, Headmaster, Tilton School

Valdosta State College, Valdosta, Georgia 31601; Natural Resource Use; Clyde E. Connell, Department of Biology

## Summer Conferences

A small program of Conferences for Secondary School Teachers; Supervisors, and other School Administrators, was supported by the National Science Foundation in 1971. These instructional conferences are shorter (4 weeks or less) and usually more specialized than Summer Institutes.

### Summer Conferences in Environmental Sciences–1971

**Engineering Concepts Curriculum Project**

University of Illinois, Chicago, Illinois 60680; Henry A. Setton, Department of Engineering

**High School Geography Project**

National Council for Geographic Education, 111 West Washington Street, Chicago, Illinois 60602; Paul F. Griffin

## In-Service Institutes

This Program provides participants with opportunities to obtain supplemental instruction in science and mathematics at times which permits them to carry on their regular teaching duties.

### In-Service Institutes in Environmental Sciences—1971-72

University of Alaska, Anchorage, Alaska 99503; Biological Sciences/Special Emphasis to Conservation Research; Roland F. Stickney, Department of Education

Alaska Methodist University, Anchorage, Alaska 99504; Environmental Studies; William A. Lewis, Department of Education

University of Arizona, Tucson, Arizona 85721; Integrated Biology, Inorganic Chemistry, Field Studies in Environmental Science; Robert W. Hoshaw, Department of Biological Sciences

California State College at Fullerton, Fullerton, California 92631; Human Ecology; George C. Turner, Department of Science and Mathematics Education

San Francisco State College, San Francisco, California 94132; Urban Environmental Approach to Earth Science (ESTPP); Raymond Pestrong, Department of Geology

Colorado School of Mines, Golden, Colorado 80401; Introductory Physics, Applied Physical Measurements, Introduction to Environmental Science; Jerrold J. Burnett, Department of Physics

Saint Joseph College, West Hartford, Connecticut 06117; Biochemistry, Environmental Studies; Sr. M. Clare Markham, Department of Chemistry

Northeastern Illinois State College, Chicago, Illinois 60625; Earth Science With an Emphasis on Environment (ESCP); Musa Qutub, Department of Earth Science

Kansas State Teachers College, Emporia, Kansas 66801; Earth and Environmental Science (ESCP, IPS, TSM); Thomas E. Bridge, Physical Science Department

Eastern Nazarene College, Wollaston, Massachusetts 02170; History of Mathematics, Linear Algebra, Principles of Chemistry, History of Physical Science, Environmental Biology; Gerald E. Lashley, Department of Mathematics

College of the Holy Cross, Worcester, Massachusetts 01610; Environmental Biology; Rev. John W. Flavin, S.J., Department of Biology

Western Michigan University, Kalamazoo, Michigan 49001; Biological Constituents, Evolution, Human Ecology, Invertebrate Zoology; Clarence J. Goodnight, Department of Biology

Bemidji State College, Bemidji, Minnesota 56601; Introductory Physical Science, Intermediate Science Curriculum Study–ISCS, Chemistry II (CHEMS), Analytical Instrumentation, Biology of Aquatic Plants and Animals in Northern Minnesota, Human Ecology, Introduction to Number Theory, Computer Programming for Secondary Teachers; Gerald J. Smith, Department of Mathematics

St. Cloud State College, St. Cloud, Minnesota 56301; Environmental Science, Physiology of Bacteria; Harold Hopkins, Department of Biology

Foresta Institute for Ocean and Mountain Studies, Carson City, Nevada 89701; Environmental Sciences-Ecology; Richard Gordon Miller, Director, Box 620

State University of New York at Binghamton, Binghamton, New York 13901; Environmental Science; Donald R. Coates, Department of Geology

State University College at Buffalo, Buffalo, New York 14222; Population and Environmental Problems; William C. Schefler, Department of Biology

Union College, Schenectady, New York 12308; Environmental Biology, General Geology, Curricular Materials in Mathematics; Edwin F. Gillette, Department of Mathematics

Miami University, Oxford, Ohio 45056; Biology and Environmental Science-BSCS; Charles M. Vaughn, Department of Zoology and Physiology

The Ohio State University, Columbus, Ohio 43210; Environmental Geology; Victor J. Mayer, Department of Geology

Ohio University, Athens, Ohio 45701; Environmental Studies-Earth Science (ESTPP); Ray Skinner, Jr., Department of Secondary Education

Millersville State College, Millersville, Pennsylvania 17551; Environmental Chemistry, Biological Techniques, Problems in Earth Science; William B. McIlwaine, Department of Earth and Space Science

University of Scranton, Scranton, Pennsylvania 18510; Environmental Biology, Chemical Education Material and Systems, Introduction to Computers and their Application, Introduction to Electronics and Electronic Instruments; Harry B. Strickland, Dean, Graduate School

University of South Carolina, Columbia, South Carolina 29208 (Classes to be held in Greenville); Environmental Earth Science; Tudor T. Davies, Department of Geology

Fort Wright College, Spokane, Washington 99204; Environmental Biology, Experimental Ecology, Modern Topics in Chemistry, Biochemistry, Urban Geography, Mineralogy; Sr. Ione Gautereaux, Department of Science

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## PRE-COLLEGE STUDENT DEVELOPMENT

### Secondary School Student Science Training Program

Opportunities are provided by the National Science Foundation for academically outstanding secondary school students to obtain intensive experience in science and mathematics during the summer. By giving science-oriented high school students an experience with college-level instruction and research, the Foundation seeks to stimulate their scholarly development and to encourage the further development of similar programs with other sources of support. Duration of activities ranges between 5 and 8 weeks.

#### Student Science Training Programs in Environmental Sciences—1971

Michigan Technological University, Houghton, Michigan 49931 (to be held on Summer Island, Lake Michigan); Ecology and Forestry (Research); Kenneth J. Kraft, Department of Biological Science

University of Montana, Missoula, Montana 59801 (to be held at the Lubrecht Experimental Forest); Ecology, Conservation, and Environment; Thomas J. Nimlos, School of Forestry

Nebraska Wesleyan University, Lincoln, Nebraska 68504; Environmental Science (includes research); Paul H. Laursen, Department of Chemistry

Foresta Institute for Ocean and Mountain Studies, Carson City, Nevada 89701; Field Ecology and Environmental Studies (Includes Research); Richard Gordon Miller, Box 620, R. R. 1, Carson City

Polytechnic Institute of Brooklyn, Brooklyn, New York 11201; Environmental Studies; P. B. Lederman, Department of Chemical Engineering, 333 Jay Street

State University College, Fredonia, New York 14063; Environmental Science–Water Quality; Roy A. Keller, Lake Erie Environmental Studies

Tager Institute for Environmental Studies (a consortium); Environmental Quality; Jack R. Pierce, Department of Biology, Austin College, Box 128, Sherman, Texas 75090

## UNDERGRADUATE CURRICULUM ACTIVITIES

### Environmental Sciences

1. An Introduction to the Implications of Technology, University of Utah, Salt Lake City, Utah 84112. *Technology for the Non-Technologist* published by Addison Wesley, Reading, Massachusetts 01867.
2. Film Series: The Promise of the Life Sciences, Graduate School, U.S. Department of Agriculture, Washington, D.C. 20250.
3. Films for Evolution and Population Biology (filmed in the Galapagos Archipelego Islands) George A. Bartholomew, University of California, Los Angeles, California 90024.

There are a number of projects currently under way. In some cases, no materials are available yet. Further information is available from the projects.

1. Urban Operational Simulation Curriculum Development Project, Robert A. Pickett, Environetics, Incorporated, 1100 17th Street NW., Washington, D.C. 20036.
2. Interdisciplinary Curriculum in Environmental Studies, James F. Hornig, Dartmouth College, Hanover, New Hampshire 03755.
3. Commission on College Geography Publications, a number of which bear on environmental sciences, Association of American Geographers, 1146 16th Street NW., Washington, D.C. 20036.
4. Council on Education in the Geological Sciences Publications, a number of which bear on environmental sciences, American Geological Institute, 2201 M Street NW., Washington, D.C. 20037.
5. Curriculum Innovation in the Area of Science, Technology, and Society, F. A. Long and R. Bowers, Cornell University, Ithaca, New York 14850.
6. Environmental Science Teacher Preparation Program. (Grades 7-12). A component of The Center for Teachers, Melburn R. Mayfield, director, Austin Peay State University, Clarksville, Tennessee 37040—The first students are being enrolled in September 1971.

## UNDERGRADUATE INSTRUCTIONAL PERSONNEL DEVELOPMENT

**Summer Institutes in Environmental Sciences for College Teachers—1971**

Arizona State University, Tempe, Arizona 85281; Desert Biology; A study of the biota of deserts and factors affecting it; Gordan L. Bender, Department of Zoology

Arizona State University, Tempe, Arizona 85281; Bacterial Ecology; Systematic Bacteriology and the physiological role of bacteria in soil, water, and higher organisms; Roy M. Johnson, Department of Botany and Microbiology

University of Houston, Houston, Texas 77004; Population Biology; David L. Jameson, Department of Biology

University of Puerto Rico, Rio Piedras, Puerto Rico 00931; Marine Biology and Tropical Ecology; physiographic factors affecting tropical marine fauna and flora; effect of physiographic and physiological factors on the distribution of living organisms; Herminio Lugo Lugo, Department of Biology

Stanford University, Pacific Grove, California 93950; Marine Biology; John H. Phillips, Jr., Hopkins Marine Station

Colorado State University, Fort Collins, Colorado 80521; Field Biology; an approach to Botany, Zoology, Ecology, and Geology which integrates these fields through study of their interrelationships occuring in the natural state; J. Forbes McClellan, Department of Zoology

University of Oklahoma, Norman, Oklahoma 73069; Systems Ecology; Systems modeling in ecology, operations research methodology, and computer-aided experimentation in aquatic and terrestrial ecosystems; Paul G. Risser, Department of Botany and Loren G. Hill, Department of Zoology

Stanford University, Stanford, California 94305; Urban Economics; Urban economic growth and structure, human resources in urban economies, and the public sector of urban economies; Henry Levin, Department of Economics

**Short Courses in Environmental Sciences for College Teachers—Summer 1971**

Oak Ridge Associated Universities, Oak Ridge, Tennessee 37830; Applied Ecology; for chemistry teachers (supported jointly with the Atomic Energy Commission); L. K. Akers, Special Training Division

University of Delaware, Newark, Delaware 19711; Energy and Moisture Balance Climatology; Energy and mass exchanges at the earth's surface; evaluation of radiation and water balances, turbulent diffusion, heat and momentum fluxes; and application of energy and mass budget information to practical problems of the man-environment relationship; John R. Mather, Department of Geography

Ohio State University, Columbus, Ohio 43210; Models of Urban Spatial Structure and Ecology; Models of urban structure with emphasis on mathematical and statistical models of the spatial form and ecological patterns of the city and the related dynamics; Kent P. Schwirian, Department of Sociology

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## UNDERGRADUATE STUDENT DEVELOPMENT

### Undergraduate Research Participation

This program is designed to provide undergraduate students with research or independent study opportunities under the guidance of competent research directors, principally for full-time (usually summer) projects, also for some part-time (academic year) projects. The institution receiving the award selects the participants. A fair number of these awards deal with environmental sciences.

### Student-Originated Studies

Through this program, the Foundation provides support for student-originated and student-directed research in environmental problems. The program seeks to encourage serious students in science to express in productive ways their growing interest for the environmental well-being of the Nation; also to provide support for groups of college and university students who can demonstrate their readiness to assume increasing responsibility for their own educational development.

**Student-Originated Studies—Summer 1971**

| INSTITUTION<br>CITY, STATE, ZIP | STUDENT PROJECT DIRECTOR<br>ADDRESS | PROJECT TITLE |
|---|---|---|
| ALABAMA | | |
| Auburn University<br>Auburn, Alabama 36830 | Mr. Andrew C. Rucks<br>c/o Dr. Hal B. Pickle<br>School of Business | Air and Water Pollution Control by the Textile Industry in the Southeast |
| ALASKA | | |
| University of Alaska<br>College, Alaska 99701 | Mr. Bryan MacLean<br>c/o Dr. Robert B. Weeden<br>Department of Wildlife Management | Resource Utilization and Environmental Contamination in a Rapidly Changing Alaskan Eskimo Village |
| ARIZONA | | |
| University of Arizona<br>Tucson, Arizona 85721 | Mr. Garry R. Allen<br>c/o Dr. William Gensler<br>Department of Electrical Engineering | Atmospheric Dispersion of Sulfur Dioxide from Copper Smelters |
| CALIFORNIA | | |
| California State Polytechnic College<br>San Luis Obispo, Calif. 93401 | Mr. John H. Robinson<br>c/o Mr. S. Ernest Swickard<br>School of Architecture | Socio-Economic Impact of the Palmdale Intercontinental Airport on a Desert Region of Los Angeles County |
| San Diego State College<br>San Diego, California 92115 | Mr. Philip J. Riggan<br>c/o Dr. Paul H. Zedler<br>Department of Biology | Physical, Biological, and Sociological Effects of Chaparral Fires in Southern California |
| San Jose State College<br>San Jose, California 95114 | Mr. Mark Tigan<br>c/o Dr. Donald W. Aitken<br>Department of Environmental Studies | Relationship of Environmental Quality to Human Health and the "Quality of life" |
| Sonoma State College<br>Rohnert Park, California 94928 | Miss Sharron L. Mee<br>c/o Dr. James B. Gale<br>Department of Physical Education | Physiological Effects of Exercising in a Polluted Atmosphere |
| Harvey Mudd College<br>Claremont, California 91711 | Mr. Charles W. Horton<br>c/o Dr. J. Richard Phillips<br>Department of Engineering | Mathematical Models and Computer Simulation of Smog Production in the Pomona Valley of California |
| Stanford University<br>Stanford, California 94305 | Mr. Mark R. Shelley<br>c/o Dr. Welton L. Lee<br>Department of Biology | Effects of Sewage Discharge on Monterey Bay |
| University of California<br>Berkeley, California 94720 | Miss Lynne Diane Houck<br>c/o Dr. Patrick J. Pagni<br>Department of Mechanical Engineering | Forest Fire Research: Control, Data Acquisition, and Modeling |
| University of California<br>Berkeley, California 94720 | Mr. Robert Dale Kelso<br>c/o Dr. Herbert G. Baker<br>Department of Botany | Grazing Pressure and Successional Changes in the Biotic Communities of the Point Reyes National Seashore |
| University of California<br>Riverside, California 92502 | Mr. Richard W. Carey<br>c/o Dr. Robert W. Gill<br>Department of Life Sciences | Development of Environmental Curriculum Resource Materials for Grades 4 through 12. |

COLORADO

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|---|---|---|
| Colorado State University<br>Fort Collins, Colorado 80521 | Mr. James R. Zuboy<br>c/o Dr. Howard Alden<br>Department of Outdoor Recreation | Development of a Multiple Use Plan for the Colorado State Forest |
| University of Denver<br>Denver, Colorado 80210 | Mr. Eloy Soza<br>c/o Dr. Ralph E. Williams<br>Department of Mechanical Sciences and Environmental Engineering | Design of a Migrant and Rural Farm Worker Housing Community |

CONNECTICUT

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|---|---|---|
| Wesleyan University<br>Middletown, Connecticut 06457 | Mr. Glenn R. Harris<br>c/o Dr. Jelle de Boer<br>Department of Geology | Feasibility Study of Quarries as Dumping Sites for Disposal of Solid Wastes |

DELAWARE

| | | |
|---|---|---|
| University of Delaware<br>Newark, Delaware 19711 | Mr. Mark Graustein<br>c/o Dr. Norman F. Collins<br>Department of Agricultural Engineering | The Role of Insects in Animal and Processing Plant Waste Breakdown |

DISTRICT OF COLUMBIA

| | | |
|---|---|---|
| The Catholic University of America<br>Washington, D. C. 20017 | Mr. Kenneth Strom<br>c/o Dr. Leopold May<br>Department of Chemistry | Some Ecological Effects of Sanitary Landfills |

FLORIDA

| | | |
|---|---|---|
| Jacksonville University<br>Jacksonville, Florida 32211 | Mr. Sam S. Hill, III<br>c/o Dr. J. Richard Warren<br>Director, Continuing Education | Design of an Urban Transportation System for Jacksonville, Florida |
| New College<br>Sarasota, Florida 33578 | Mr. Paul Carlson<br>c/o Dr. John B. Morrill<br>Chairman, Department of Natural Sciences | Ecological Effects of Spoil Islands Created by Dredging in Estuaries along the West Coast of Florida |
| University of South Florida<br>Tampa, Florida 33620 | Mr. Peter M. Hahn<br>c/o Dr. M. W. Anderson<br>Department of Structures, Materials, Fluids | Characteristics, Potential Uses, and Control of the Water Hyacinth |
| University of Miami<br>Coral Gables, Florida 33124 | Mr. Patrick H. Neale<br>c/o Dr. Carl H. Snyder<br>Department of Chemistry | Chemical and Biological Relationships in Deep Water Areas of the Everglades |

GEORGIA

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|---|---|---|
| Georgia Institute of Technology<br>Atlanta, Georgia 30332 | Mr. J. Douglass Mullins<br>c/o Dr. Joseph J. Talavage<br>School of Industrial and Systems Engineering | Relationships between the Proposed Rapid Transit System, the Environment, and Sociological Factors in Atlanta |

HAWAII

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| University of Hawaii<br>Honolulu, Hawaii 96822 | Mr. Steven L. Montgomery<br>c/o Dr. D. Elmo Hardy<br>Department of Entomology | Ecology of the Hawaiian Drylands |
| University of Hawaii, Hilo College<br>Hilo, Hawaii 96720 | Mr. Michael Osato<br>c/o Dr. John G. Chan<br>Department of Biology | Biological, Chemical, and Sociological Consequences of Pollution in Hilo Bay, Hawaii |

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| **IDAHO** | | |
| University of Idaho<br>Moscow, Idaho 83843 | Mr. David Maxfield<br>c/o Dr. Chien M. Wai<br>Department of Chemistry | Heavy Metal Pollution in Sediments of the Coeur d'Alene River Delta |
| **ILLINOIS** | | |
| Northeastern Illinois State College<br>Chicago, Illinois 60625 | Mr. Ivan Ruiz<br>c/o Dr. Maria Moraites<br>Film Director-Producer<br>Learning Services | A Film Documenting Problems Faced by Puerto Ricans Who Move to Large Mainland Cities |
| Northern Illinois University<br>DeKalb, Illinois 60115 | Mr. Richard C. Stupka<br>c/o Dr. James E. Brower<br>Department of Biological Sciences | Lead Pollution Effects on Terrestrial and Aquatic Ecosystems of the Great Lakes Region |
| Northwestern University<br>Evanston, Illinois 60201 | Mr. Daniel L. Eberhardt<br>c/o Dr. Claude A. Lucchesi<br>Director of Analytical Services | Chemical, Biological, and Economic Studies of Municipal Garbage Composting |
| University of Chicago<br>Chicago, Illinois 60637 | Miss Christine Lehto<br>c/o Dr. Sol Tax<br>Department of Anthropology | Migration of Rural Indians to Urban Centers |
| University of Illinois<br>Urbana, Illinois 61801 | Mr. Richard C. Frederick or<br>Mr. Dale R. Jurich<br>c/o Dr. William Randolph Boggess<br>Department of Forestry | Effects on Society and the Environment of Alternative Methods of Packaging Goods for Household Consumption |
| **INDIANA** | | |
| Purdue University<br>Lafayette, Indiana 47907 | Mr. Hector J. Rosquete<br>c/o Dr. John E. Christian<br>Institute for Environmental Health | Air Pollution, Water Pollution, and Solid Waste Disposal Problems in the Greater Lafayette Area, Indiana |
| **IOWA** | | |
| Grinnell College<br>Grinnell, Iowa 50112 | Mr. Anthony J. Wheeler<br>c/o Dr. Kenneth A. Christiansen<br>Department of Biology | Biological and Chemical Levels of Pollution in Rock Creek Lake, Iowa |
| **KANSAS** | | |
| St. Benedict's College<br>Atchison, Kansas 66002 | Mr. Edwin J. Spicka<br>c/o Dr. Ronald W. Turner<br>Department of Biology | Air and Water Pollution in the Atchison, Kansas, Area |
| Wichita State University<br>Wichita, Kansas 67208 | Mr. Douglas K. Nelson<br>c/o Dr. Walter Bernhart<br>Department of Aeronautical Engineering | Determination of Levels and Distribution of Noise in Wichita, Kansas |
| **KENTUCKY** | | |
| Western Kentucky University<br>Bowling Green, Kentucky<br>42101 | Mr. Gary Harlow<br>c/o Dr. Donald Rowe<br>Department of Engineering Technology | Water Quality of Barren River, Kentucky |
| **LOUISIANA** | | |
| Grambling College<br>Grambling, Louisiana 71245 | Mr. Welton C. Washington<br>c/o Dr. Franklin D. Hill<br>Department of Chemistry | Blood Levels of DDT as a Function of Race, Habitat, and Socio-economic Status |
| Tulane University<br>New Orleans, Louisiana 70118 | Mr. Michael R. Howard<br>c/o Dr. John W. Rock<br>Department of Architecture | Links between Life Style and Environmental Expression in Building, Past and Present |

MAINE

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|---|---|---|
| Bowdoin College<br>Brunswick, Maine 04011 | Mr. Richard Alan Cohen<br>c/o Dr. Dana W. Mayo<br>Department of Chemistry | Detection and Estimation of Natural Regeneration Processes in the Upper Androscoggin River, Maine |
| University of Maine at Orono<br>Orono, Maine 04473 | Mr. Joseph M. Wunderle, Jr.<br>c/o Dr. Ronald B. Davis<br>Department of Botany and Geology | Physical, Ecological, Economic and Sociological Effects of Residence Patterns of Recreationists on Four Maine Lakes |

MARYLAND

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|---|---|---|
| Goucher College<br>Towson, Maryland 21204 | Miss Virginia L. Richards<br>c/o Dr. John W. Foerster<br>Department of Biological Sciences | Analysis of Degradation of Lake Roland, Baltimore |
| University of Maryland<br>College Park, Maryland 20742 | Mr. Gary C. Stanton<br>c/o Dr. Zigfridas Vaituzis<br>Department of Microbiology | Extent and Sources of Pollution in Rock Creek, Maryland and the District of Columbia |

MASSACHUSETTS

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|---|---|---|
| Amherst College<br>Amherst, Massachusetts 01002 | Mr. Bruce Pollock Thompson<br>c/o Dr. Stuart Fisher<br>Department of Biology | Quantification of the Relationships between Land Use and Water Quality in the Fort River, Massachusetts |
| Boston College<br>Chestnut Hill, Massachusetts 02167 | Mr. Stephen P. Gormican<br>c/o Reverend James W. Skehan, S.J.<br>Director, Environmental Center | Scientific, Legal, Sociological and Psychological aspects of Pollution of Lake Cochituate, Massachusetts |
| Massachusetts Institute of Technology<br>Cambridge, Massachusetts 02139 | Mr. Earl Strayhorn<br>c/o Dr. J. C. Edozien<br>Department of Nutrition & Food Science | Nutrition as Related to General Health Status of a Segment of the Greater Boston Community |
| Massachusetts Institute of Technology<br>Cambridge, Massachusetts 02139 | Mr. Noah Bass<br>c/o Dr. Rainer A. Weiss<br>Department of Physics | Atmospheric Pollution Due to Gases of Simple Molecular Structure |

MICHIGAN

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|---|---|---|
| Northern Michigan University<br>Marquette, Michigan 49855 | Mr. John Thomas<br>c/o Dr. Ronald A. Parejko<br>Department of Biology | Feasibility of Producing and Marketing a Soil-Like Product from Municipal Wastes and Mine Tailings |
| Oakland University<br>Rochester, Michigan 48063 | Mr. Roger D. Brooks<br>c/o Dr. Keith R. Kleckner<br>Department of Engineering | Power Train Design for an Electrically-Powered Automobile |
| University of Detroit<br>Detroit, Michigan 48221 | Miss Barbara J. Pickens<br>c/o Dr. John Loss<br>School of Architecture | Relationship between Changes in Physical Dwelling Unit Environment and Social Environment |
| University of Michigan<br>Ann Arbor, Michigan 48104 | Miss Suzanne C. Pick<br>c/o Dr. Howard Schuman<br>Department of Sociology | Attitudes of Working Mothers toward Child Care Centers |
| University of Michigan<br>Ann Arbor, Michigan 48104 | Mr. Sander H. Orent<br>c/o Dr. Steven Hubbell<br>Department of Zoology | Biological and Economic Aspects of Predator (Coyote) Control |

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| **MINNESOTA** | | |
| Carleton College<br>Northfield, Minnesota 55057 | Mr. Michael R. Cunningham<br>c/o Dr. Arthur L. Buikema, Jr.<br>Department of Biology<br>St. Olaf College<br>Northfield, Minnesota 55057 | Behavior and Attitudes of Vacationers in Wilderness Areas of Superior National Forest and Boundary Waters Canoe Area, Minnesota |
| University of Minnesota<br>Minneapolis, Minnesota 55455 | Mr. Gregg Shadduck<br>c/o Dr. Alan H. Humphreys<br>Department of Elementary Education | Development of Environmental Studies Blocks for High School Students |
| **MISSISSIPPI** | | |
| Mississippi College<br>Clinton, Mississippi 39056 | Mr. Burke West<br>c/o Dr. John W. Legg<br>Department of Chemistry | Lead and Gaseous Pollutants along Newly-Built and Old Highways |
| **MISSOURI** | | |
| University of Missouri<br>Columbia, Missouri 65201 | Mr. David Slusher<br>c/o Dr. Stanley E. Manahan<br>Department of Chemistry | Possible Heavy Metal Ion Transport by Trisodium Nitriloacetate (NTA) in Waste Treatment Plants and Aquatic Ecosystems |
| **NEBRASKA** | | |
| University of Nebraska<br>Lincoln, Nebraska 68508 | Mr. Mark Young<br>c/o Dr. P. J. Reilly<br>Department of Chemical Engineering | Preparation of Salable By-Products through Aerobic Fermentation of Paunch Liquors |
| **NEW HAMPSHIRE** | | |
| Dartmoutn College<br>Hanover, New Hampshire 03755 | Mr. Jeffrey W. Bock<br>c/o Dr. Charles L. Braun<br>Department of Chemistry | A study of Biological, Chemical, and Sociological Aspects of Pollution of Mascoma Lake, New Hampshire |
| New Hampshire College<br>Manchester, New Hampshire 03101 | Mr. James A. Philbrook<br>c/o Dr. William A. Hunzeker<br>Department of Management Information Systems | Evaluation of Project Head Start in Contrasting Urban and Rural Areas of New Hampshire |
| **NEW JERSEY** | | |
| Princeton University<br>Princeton, New Jersey 08504 | Mr. Thomas J. Givnish<br>c/o Dr. David J. J. Kinsman<br>Department of Geology & Geophysical Sciences | Impact of Proposed Watershed Changes on Ecology of New Jersey Pine Barrens |
| **NEW MEXICO** | | |
| New Mexico Institute of Mining and Technology<br>Socorro, New Mexico 87801 | Mr. John Gragg<br>c/o Dr. Roshan B. Bhappu<br>Department of Metallurgy | Survey of Water Quality, Soils, and Crops along the Irrigation Canal near Socorro, New Mexico |
| **NEW YORK** | | |
| Cornell University<br>Ithaca, New York 14850 | Mr. Joseph E. Schwartz<br>c/o Dr. L. Reissman<br>Department of Sociology | Appropriateness of Current Designs of Low Income Housing |
| Hofstra University<br>Hempstead, New York 11550 | Miss Gloria Gardocki<br>c/o Dr. Philip H. Ramsey<br>Department of Psychology | The Social, Psychological, and Demographic Variables which Influence Family Size and Population Growth Rates |
| Polytechnic Institute of Brooklyn<br>Brooklyn, New York 11201 | Mr. George Panoussis<br>c/o Dr. P. C. Wang<br>Department of Civil Engineering | Engineering and Psychological Studies of Vibrations in New York |

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|---|---|---|
| State University of New York-Stony Brook<br>Stony Brook, New York 11790 | Mr. Walter K. Muench<br>Dr. J. L. McHugh<br>Department of Marine Resources | An Environmental Study of Long Island's Mount Sinai Harbor |
| State University of New York-Brockport<br>Brockport, New York 14420 | Mr. Robert Bannister<br>c/o Dr. Harold Kibby<br>Department of Biological Sciences | Pollution Survey of the New York State Barge Canal |
| Syracuse University<br>Syracuse, New York 13210 | Mr. Paul Feldsher or<br>Miss Susan B. Williams<br>c/o Dr. William P. Mangin<br>Department of Anthropology | Sociological Impact of Radical Environmental Change on a Group of Seneca Indians |
| University of Rochester<br>Rochester, New York 14627 | Mr. Gregory Keating Hearn<br>c/o Dr. Edward M. Brody<br>Institute of Optics | Use of Light Scattering Techniques to Detect and Measure Particulate Matter in Water |
| NORTH CAROLINA | | |
| East Carolina University<br>Greenville, North Carolina 27834 | Mr. Stephen B. Benton<br>c/o Mr. C. W. O'Rear<br>Department of Biology | Pollution Studies of the Tar River Tributaries in North Carolina |
| Mars Hill College<br>Mars Hill, North Carolina 28754 | Miss Karen Cummings<br>c/o Dr. Fred Holtkamp<br>Department of Chemistry | Local Conditions and Practices Contributing to Environmental Degradation in a Rural Appalachian County in North Carolina |
| University of North Carolina-Asheville<br>Asheville, North Carolina 28801 | Mr. Thomas P. Graham<br>c/o Dr. John C. Bernhardt, Jr.<br>Department of Biology | Ecological Effects of Hot Water Discharged by a Electric Power Generating Plant |
| Wake Forest University<br>Winston-Salem, North Carolina 27109 | Mrs. Adelaide Anne Williams<br>c/o Dr. Peter D. Weigl<br>Department of Biology | Residue Levels of Chlorinated Hydrocarbons in Mammals as a Function of Geographic Region and Land Use in North Carolina |
| NORTH DAKOTA | | |
| North Dakota State University<br>Fargo, North Dakota 58102 | Mr. Gregory L. Olson<br>c/o Dr. Robert D. Koob<br>Department of Chemistry | Study of Air Water Pollutants and their Relationships |
| OHIO | | |
| Cleveland State University<br>Cleveland, Ohio 44115 | Mr. Steven Bill<br>c/o Dr. Robert G. Rolan<br>Department of Biology | History of Eutrophication Cycles in Lake Erie Derived from Bottom Core Samples |
| Heidelberg College<br>Tiffin, Ohio 44883 | Mr. W. Gregory Lotz<br>c/o Dr. Martin Reno<br>Department of Physics | Pollution in the Sandusky River, Ohio |
| Kent State University<br>Kent, Ohio 44240 | Mr. John Barone<br>c/o Dr. G. Dennis Cooke<br>Department of Biological Sciences | Heavy Metal Pollutants in a Section of the Cuyahoga River Watershed |
| Ohio State University<br>Columbus, Ohio 43210 | Mr. Gregory S. Trutza<br>c/o Dr. John D. Briggs<br>College of Biological Sciences | Biological Controls for Protecting Sweet Corn from the Corn Earworm |
| University of Dayton<br>Dayton, Ohio 45409 | Mr. Mark MacNealy<br>c/o Dr. Joseph D. Laufersweiler<br>Department of Biology | Control of Ozone and Titanium Dioxide Pollution by the Use of Antioxidants |

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| **OKLAHOMA** | | |
| University of Oklahoma<br>Norman, Oklahoma 73069 | Mr. W. Lawrence Harvey<br>c/o Dr. Luis H. Summers<br>Department of Architecture and Civil Engineering | The Effect of Urban Change on "The Square" of Courthouse Square Towns |
| **OREGON** | | |
| Reed College<br>Portland, Oregon 97202 | Mr. J. Peterson Myers<br>c/o Dr. Jeffrey Kelly<br>Department of Chemistry | Political, Sociological, Economic, and Biological Considerations Affecting a Predator Control Program in the Steens Mountains of Eastern Oregon |
| University of Oregon<br>Eugene, Oregon 97403 | Mr. Edward McConnaughey<br>c/o Dr. Paul Rudy<br>Director-Institute of Marine Biology | An Integrated Land and Water Use Plan for the Coos Bay Estuary |
| **PENNSYLVANIA** | | |
| Carnegie-Mellon University<br>Pittsburgh, Pennsylvania 15213 | Mr. Lawrence J. Young<br>c/o Dr. John C. Purcupile<br>Department of Mechanical Engineering | Production of Protein by Single-Celled Organisms Grown in Municipal Liquid Wastes |
| Dickinson College<br>Carlisle, Pennsylvania 17013 | Mr. Richard Blutstein<br>c/o Dr. Robert E. Leyon<br>Department of Chemistry | Effects of Municipal, Residential, and Industrial Sewage and Solid Wastes on Two Tributaries of the Susquehanna River |
| Franklin and Marshall College<br>Lancaster, Pennsylvania 17604 | Mr. Gary W. Jay<br>c/o Dr. Kenneth H. Brookshire<br>Department of Psychology | Effects of Mercury Compounds on the Central Nervous Systems of Fish |
| Pennsylvania State University<br>University Park, Pennsylvania 16802 | Mr. Vaughn L. Glasgow<br>c/o Dr. W. R. Weisman<br>Department of Art History | A Socio-Historic Determination of Cast Iron Structures in the So-Ho District of New York City |
| Pennsylvania State University<br>University Park, Pennsylvania 16802 | Mr. Marlin L. Hornberger<br>c/o Dr. Edwin L. Cooper<br>Department of Biology | Biological and Chemical Effects of Land Use on Little Pine Creek, Pennsylvania |
| Pennsylvania State University<br>University Park, Pennsylvania 16802 | Mr. Keith G. Kirk<br>c/o Dr. A. L. Guber<br>College of Earth and Mineral Sciences | The Effectiveness of Backfilling in Controlling Acid Mine Drainage in the Allegheny Plateau of Pennsylvania |
| **RHODE ISLAND** | | |
| Brown University<br>Providence, Rhode Island 02912 | Mr. John H. Flaschen<br>c/o Dr. John Imbrie<br>Department of Geological Sciences | Water Quality Problems in the Pawtuxent River Basin, Rhode Island |
| **SOUTH CAROLINA** | | |
| Clemson University<br>Clemson, South Carolina 29631 | Mr. James E. McCoy<br>c/o Dr. David E. Shulenburger<br>Department of Economics | Physical Mobility of the Aged in a Southern City and its Effects on their Socio-Economic Environment |
| **SOUTH DAKOTA** | | |
| Mount Marty College<br>Yankton, South Dakota 57078 | Mr. Jesse Wolf<br>c/o Sister Kieran Diggins<br>Department of Biology | Benthic Organisms in Natural and Channelized Portions of the Missouri River |

TENNESSEE

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|---|---|---|
| Carson-Newman College<br>Jefferson City, Tennessee<br>37760 | Mr. Douglas S. Shafer<br>c/o Dr. Joe A. Chapman<br>Department of Biology | Level of Pollutants and Bacteria in the Underground Waters of East Tennessee |
| Southwestern at Memphis<br>Memphis, Tennessee 38112 | Mr. Allen Warner Phelps<br>c/o Dr. Bobby R. Jones<br>Department of Biology | Pathways by Which Mercury is Introduced into an Ecosystem |

TEXAS

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|---|---|---|
| William Marsh Rice University<br>Houston, Texas 77001 | Mr. Donald Robert Quartel, Jr.<br>c/o Dr. Brien Ralph Hammond<br>Department of Biology | Mercury Concentrations in Gulf Coast Mullet and the Mullet Food Chain |
| Texas Tech University<br>Lubbock, Texas 79409 | Mr. Alex F. Sears<br>c/o Dr. George O. Elle<br>Department of Agronomy | Quality of Source Water for Proposed Recreational Lakes in Yellowhouse Canyon near Lubbock, Texas |

UTAH

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|---|---|---|
| University of Utah<br>Salt Lake City, Utah 84112 | Mr. Harvey P. Cahoon<br>c/o Dr. Ivan B. Cutler<br>Department of Material Science & Engineering | Feasibility of Making Insulation Material by Foaming Waste Glass |
| University of Utah<br>Salt Lake City, Utah 84112 | Mr. Clinton Kay Carter<br>c/o Dr. Kimball T. Harper<br>Department of Biology | Ecology of Antelope Island and Farmington Bay Area of Great Salt Lake |
| Utah State University<br>Logan, Utah 84321 | Mr. Richard H. Fuller<br>c/o Dr. Raymond L. Kerns, Jr.<br>Department of Geology | The Extent of Pollution and its Control in the Bear Lake Basin |

VERMONT

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|---|---|---|
| University of Vermont<br>Burlington, Vermont 05401 | Mr. Wayne Timura<br>c/o Dr. William J. Jewell<br>Department of Civil Engineering | Analysis of Transportation and Environmental Resources of the Waterfront in Burlington, Vermont |

VIRGINIA

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|---|---|---|
| Old Dominion University<br>Norfolk, Virginia 23508 | Mr. John F. Batkins<br>c/o Dr. Robert L. Ake<br>Department of Chemistry | Land Use Planning in Virginia Beach |
| Randolph-Macon Woman's College<br>Lynchburg, Virginia 24504 | Miss Anne H. Lindsey<br>c/o Dr. Franklin F. Flint<br>Department of Biology | Ecological Study of Blackwater Creek Basin, Preliminary to its Development as a Park in Lynchburg, Virginia |

WASHINGTON

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|---|---|---|
| University of Washington<br>Seattle, Washington 98105 | Mr. John G. Comis<br>c/o Dr. E. B. Welch<br>Department of Civil Engineering<br>Water and Air Resources | Water Quality Study of Swamp and Coal Creeks, King County, Washington |

WEST VIRGINIA

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|---|---|---|
| West Virginia University<br>Morgantown, West Virginia 26506 | Mr. Roger D. Rader<br>c/o Dr. James R. Stafford<br>Department of Theoretical and Applied Mechanics | Noise Abatement in Dormitories |

WISCONSIN

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|---|---|---|
| Carroll College<br>Waukesha, Wisconsin 53186 | Mr. David Radloff<br>c/o Dr. Richard E. Bayer<br>Department of Chemistry | Measurement and Control of Feed Lot Pollution |
| University of Wisconsin<br>Madison, Wisconsin 53706 | Mr. Jacob J. Emmerick<br>c/o Dr. Robert E. Bowman<br>Department of Psychology | Effects of Overcrowding on the Behavior and Biochemistry of Primate Groups |

WYOMING

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| University of Wyoming<br>Laramie, Wyoming 82070 | Mr. Paul Lewis<br>c/o Dr. Dennis H. Knight<br>Department of Botany | Commercial Clear-Cutting in High Altitude Forests of Wyoming |

## College Science Improvement Program

These are comprehensive grants available to predominantly undergraduate institutions and cover the full range of science education activities. Grants listed here are those with an environmental science component.

Occidental College, Los Angeles, California 90041. An oceanographic vessel was outfitted for use in research and teaching by a consortium of five institutions. John S. Stephens, Jr., Department of Mathematics

Monmouth College, Monmouth, Illinois 61462. Equipment for a field station, faculty research salaries and student research stipends were supported. Frank S. McKenna, Dean of the College

Wabash College, Crawfordsville, Indiana 47933. Renovation of a field laboratory in the Allee Woods, site of several long term field projects. Edward Haenisch, Science Division

Antioch College, Yellow Springs, Ohio 45387. Support was provided to create an Institute of Undergraduate Studies in Science that offers a program of research and studies in the environment, the experimental sciences and mathematics, emphasizing interdisciplinary problems. Thomas C. Holyoke, Science Institute

Wilkes College, Wilkes Barre, Pennsylvania 18703. A new environmental sciences program has been established. Consultants aided the faculty in designing the courses. Laboratory space was renovated and equipped. Ralph B. Rozelle, Division of Natural Sciences and Mathematics

Southwestern at Memphis, Memphis, Tennessee 38112. Purchase of renovation of a mobile field laboratory for use in environmental studies to complement existing programs and to initiate a summer field studies program. Robert L. Amy, Department of Biology

Old Dominion University, Norfolk, Virginia 23508. An environmental laboratory was outfitted for the use of nine undergraduate biology courses. Undergraduate research will also take advantage of the natural environment for observation and collection. Melvin A. Pittman, School of Sciences

Sweet Briar College, Sweet Briar, Virginia 24595. An ecology center has been established. Long-range ecology and behavioral science–environmental studies will utilize the 3,400 acre campus. Courses are being developed by faculty, visiting lectures, guest professors and consultants. Jane C. Belcher, Department of Biology

## GRADUATE EDUCATION ACTIVITIES

### Environmental Sciences

University of Wisconsin, Green Bay, Wisconsin; Course in Field Biometerological Techniques; C. Tanner

American Geological Institute, Washington, D.C.; Publication of a Prototype Geological Highway Guide; F. D. Holland

Organization for Tropical Studies, Inc., South Miami, Florida; A Continuing Program of Graduate Education in Tropical Studies

Cornell University, Ithaca, New York; Pest Population Ecology: An Inter-University Training Program; D. Pimentel

Oregon State University, Corvallis, Oregon; Pest Population Ecology: An Inter-University Training Program; P. Oman

University of California, Berkeley, California; Pest Population Ecology: An Inter-University Training Program; C. B. Huffaker

North Carolina State University, Raleigh, North Carolina; Pest Population Ecology: An Inter-University Training Program; D. E. Davis

Yale University, New Haven, Connecticut; Field-Based Doctoral Dissertation Projects; K. M. Waage

Washington University, St. Louis, Missouri; A Graduate Education Program in Building Technology: Building Environmental Systems; E. C. Hoelscher

University of Hawaii. Honolulu, Hawaii; Interdisciplinary Program in Human Ecology; R. W. Armstrong

University of Massachusetts, Amherst, Massachusetts; Development of New Courses in Ocean Engineering; W. A. Nash

Colorado State University, Fort Collins, Colorado; The Technology and Application of Remote Sensing of Natural Resources; L. D. Miller

University of Tennessee, Knoxville, Tennessee; Ecology for Planners and Engineers; J. T. Tanner

The Western Montana Scientists' Committee for Public Information, Missoula, Montana; A Project To Inform the Citizens of Montana of the Scientific Aspects of Environmental Pollution; C. C. Gordon

University of California, Los Angeles, California; Doctoral Program in Environmental Science and Engineering: An Experiment in Education; W. F. Libby

University of California, Berkeley, California; Development of Graduate Training in Methods of Architectural Behavior Research; R. L. Meier

University of Nevada, Reno, Nevada; Preparation of an Instructional Film: Across the Sierra–Genesis of a Geosyncline; E. R. Larson

Wayne State University, Detroit, Michigan; Development of an Environmental Engineering Curriculum; R. H. Kummler

University of Oregon, Eugene, Oregon; Interdisciplinary Student-Originated Research Training: Study of the Development of the Galapagos Archipelago; F. J. Swanson

University of California, Riverside, California; Pest Population Ecology: An Inter-University Training Program; P. DeBach

Pennsylvania State University, University Park, Pennsylvania; Inter-University Program in Applied Ecology Related to Ecological Impact of Mine-Acid Drainage and Waste-Water Spray Irrigation; E. D. Bellis

North Carolina State University, Raleigh, North Carolina; Master's Training in Insect Pest Management; R. L. Rabb

Rutgers, the State University, New Brunswick, New Jersey; Inter-University Program in Applied Ecology Related to Air Pollution and Pesticide Problems; P. G. Pearson

University of South Dakota, Vermillion, South Dakota; Reorientation of Autecology Course To Emphasize the Biophysics of Energy Exchange; G. R. Hoffman

Stanford University, Stanford, California; Study on Mass Media Coverage of Environmental Problems; D. M. Rubin, D. P. Sachs, J. R. Krupp

Woods Hole Oceanographic Institution, Woods Hole, Massachusetts; Postdoctoral Research Training Program in Oceanography; A. Maxwell

University of Washington, Seattle, Washington; Training Program in Marine Sciences at Friday Harbor Laboratories; R. Fernald

Pennsylvania State University, University Park, Pennsylvania; Advanced Institute on Statistical Ecology in the United States; G. Patil